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AUTHOR Sherblom, John; La Riviere, Conrad
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ABSTRACT

In order to investigate speech accommodation--the way in which communicators influence each other's speaking patterns and rhythms--a study examined its occurrence, as well as the extent of a conversational partner's influence, and the influence of interpersonal uncertainty and differences in arousal level upon that accommodation process. Sixty-five pairs of undergraduate subjects discussed a problem situation, uttering a single given sentence both before and after their conversation. These pre- and post-conversation sentences were measured for speaking rate, utterance length, and vocal jitter, and comparatively analyzed. Results showed that a conversational partner's influence was substantial, and suggest that interpersonal uncertainty and differences in arousal level are both influencing factors in speech accommodation. (Twenty-nine references and five tables of data are attached.) (SR)

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Speech Accommodation and the effects of Cognitive Uncertainty and Physiological Arousal upon it

John Sherblom

(207) 581-1940

Department of Speech Communication

320 Stevens Hall

University of Maine

Orono, Maine 04469

and

Conrad La Riviere

Department of Speech Communication

345 Stevens Hall

University of Maine

Orono, Maine 04469

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Speech Accommodation and the effects of Cognitive Uncertainty and Physiological Arousal upon it

Abstract

Speech Accommodation--the way in which communicators influence each other's speaking characteristics--is one of the most fundamental processes of communication. The present study examines the occurrence of speech accommodation. It also investigates the extent of a conversational partner's influence, and the influence of interpersonal uncertainty and differences in arousal level upon that accommodation process. Regression analysis results show that a conversational partner's influence is substantial. Significant multivariate analysis of covariance results suggest that interpersonal uncertainty and differences in arousal level have an influence on accommodation.

Speech Accommodation and the effects of Cognitive Uncertainty and Physiological Arousal upon it

Speech Accommodation is one of the most fundamental processes of communication. It is a process through which communicators influence each other's speaking patterns and rhythms (Street & Giles, 1983; Street, 1984; Cappella, 1981; 1983; 1984). Speech Accommodation, is also one of the least understood processes of interpersonal communication (Street and Brady, 1982).

Review of the Literature

Early analyses of speech processes were done by Condon and his associates and referred to as Speech Synchrony. Speech Synchrony was, for Condon and Ogston (1966), part of a larger, more complex set of processes involving within and between person synchronies. These included head, eye, mouth, trunk, arm, hand, leg, and foot synchronies (Condon & Ogston, 1966; 1967). Interpersonal Synchrony suggested that the listener's body moves in precise harmony with, and changes synchronously to, the speech and body movements of the speaker (Condon & Ogston, 1967).

While Rosenfeld (1981, p. 89) calls much of this early work into question, he summarizes the research on the interpersonal synchrony by suggesting that the question is no longer, "Is interaction synchronous?" but "What are the varieties of interactional synchronies?"

Pelrose (1982, p. 24) cites further evidence for interactional synchrony in such diverse research efforts as cross-cultural investigations, studies of 20 minute old infants, studies of "individuals who exhibit pathological behavior patterns," and "in aphasic, dyslexic, retarded, cerebral palsied, and autistic children." From these diverse findings it appears that an interactional influences occur that affect the speech characteristics of the communicators.

Recent research has referred to these speaking synchronies by many names including: congruence, reciprosity, symmetry, interspeaker influence, and speech convergence (Street & Giles, 1983; Cappella & Planalp, 1981; Street, 1984). Whatever the name, a phenomenon exists that when normal, healthy speakers engage in conversation, their speaking characteristics tend to influence each other.

Underlying Mechanisms of the Process

There are two general underlying mechanisms invoked to explain the how and why of this process. One states that the speech processes reflect what is occurring in cognitive processes (Street & Giles, 1983); the other that the speech processes reflect what is occurring in levels of physiological arousal (Cappella 1983; Cappella & Greene, 1982). Street and Giles (1982, p. 205) suggest that accommodation expresses a speaker's "desire for social integration". In this respect it serves a similar social function to uncertainty reduction (Berger & Bradac, 1982). Both serve to orient one communicator to another.

Cappella (1983) suggests a discrepancy-arousal explanation. Discrepant speech characteristics generally arouse more negative feelings toward a speaker. Less discrepant ones produce more positive feelings. Communicators seek to moderate their levels of arousal and therefore modify their speaking

characteristics in relation to each other.

The purpose of the present study is to examine this interspeaker influence process upon the speaking characteristics of communicators. The study seeks to answer three main research questions.

1) What is the strength, or importance of this speech accommodation process?
2) Is speech accommodation a convergent, divergent, or steady-state synchronous process?
3) What are some of the influences on the speech accommodation process? Specifically what are the influences of: a conversational partner's sex relative to speaker's sex; a communicator's level of cognitive uncertainty about the conversational partner; and the communicator's level of arousal?

Street (1984) has shown different effects in same-sex and mixed-sex conversational dyads. Street and Giles (1983) and Cappella (1983) suggest respectively the influence of cognitive and arousal level influences.

The prosodic characteristics cited most frequently as evidencing accommodation are the timing characteristics of vocal rate, or rhythm, the duration characteristics of vocalization, pause, and turn durations, and the measures of vocal jitter.

Speech Characteristics in which the Processes occur

Cappella and Planalp (1981) present vocalization and pause durations as important. Pelrose (1982) suggests the importance of speech rhythm--the relationship of fluent to hesitant periods in speech. Street (1984) uses speech rate and turn duration in his research. Cappella (1984) suggests pause and utterance length, turn duration, and vocal intensities, as salient.

Analysis of vocal jitter requires more specialized instrumentation than does the study of speaking rates and durations. It has therefore not received as much research attention in the study of speech accommodation. Vocal jitter has been examined by communication scholars within other contexts, however. Hocking and Leathers (1980) investigated vocal nervousness as an indication of deception in interview situations. Wiegele (1978) analyzed the amount of vocal jitter present in public speeches as an index to the amount of psychological stress experienced during the speech. Leith and Timmons (1983) examined the differences in amounts of vocal jitter between stutterers and non-stutterers.

Methods

Measures

In the present study Speech Accommodation is indexed in three ways. It is investigated as accommodations in Speaking Rate, Utterance Length, and the characteristics of Vocal Jitter.

Speaking Rate Accommodation examines the shift in how fast a communicator talks relative to a conversational partner's rate of speech. Speaking Rate is calculated as the number of words spoken divided by the amount of speaking time. The present measure is similar to Street and Brady's (1982) words-per-minute measure of speaking rate. But the current measure removes the inter-word gaps from the calculation. It is, therefore, a measure of the rate at which words are spoken rather than of the rate at which an utterance is produced.

The second measure of Speech Accommodation is Utterance Length. Utterance

Length is the total amount of time used in the production of an utterance. It includes both the duration of the spoken words and any inter-word gaps in the utterance. Utterance Length is a measure similar to Cappella's (1984) measures of utterance length, and turn duration. Its calculation is used here to investigate utterance length accommodations.

Vocal jitter describes the minute fluctuations in the voice caused by microtremors occurring in the muscles of the vocal folds (Brenner, Branscomb, & Schwartz, 1979). These physiological tremors occurring at approximately 10 cycles per second are a normal accompaniment of the activities of voluntary muscles (Lippold, 1971). Both the muscles controlling the vocal folds and those of the formant producing cavities in the throat and nasal passages experience these tremors causing inaudible shifts in the formant frequencies of the words produced (Lambert, 1974).

Vocal Jitter is measured using a psychological stress evaluator (PSE) and a technique similar to Wiegele (1978), and Leith and Timmons (1983). Dektor Counterintelligence and Security manufactures the psychological stress evaluator that is designed to detect and chart microtremors of the voice in a way that allows detailed analysis of them. These vocal perturbations can be quantified both in count and in amplitude. Three analyses of vocal jitter are performed in the present study. These are calculations of the vocal jitter count, or amount of jitter present in a word; the relative amplitude peak of that jitter; and the jitter amplitude during the first steady state portion of a word.

Jitter count is obtained by counting the number of jitter perturbations, or fluctuation peaks, in a word. This number is divided by the word duration to produce a calculation of the number of jitter cycles per unit of time.

The relative amplitude peak of jitter is measured as the distance from the baseline of the word to the top of the jitter peak having the highest amplitude in each word. This provides a relative measure of jitter amplitude for a comparison of speakers recorded and analyzed under the same conditions.

The jitter amplitude steady state index is obtained by measuring the amplitude of one full cycle of a jitter waveform during the first steady state portion of a word. The steady state portion of a word normally occurs during the articulation of a vowel such as the "o" in "Joe." During this portion of the word the jitter amplitude remains relatively constant. As this portion makes up a large part of the word duration through time, the jitter amplitude steady state provides a good index of the word's jitter amplitude.

All three of these measures are made for the individual words and summed across all the words in an utterance to arrive at an index for the utterance. Vocal jitter is calculated as the sum of the standardized utterance scores for jitter count, relative amplitude of jitter peaks, and the jitter amplitude steady state measures.

Each of the speech characteristics, Speaking Rate, Utterance Length, and the three measures of Vocal Jitter are examined before and after a conversation in relation to a conversational partner's comparable speech characteristic. A calculation is performed to determine whether a participant's characteristic is more similar to a partner's characteristic at the end of a conversation than it was at the beginning. These calculations index Speech Accommodation for each of these characteristics.

Measure of Uncertainty

The Parks and Adelman questionnaire used in the present study asks respondents to indicate how strongly they agree with statements such as: "I do not know my partner very well." Parks and Adelman obtained internal reliability

estimates of alpha= .80 and .81 for this measure. The present study is an investigation of cognitive uncertainty as it exists between conversational partners rather than dating partners as in Parks and Adelman's study. Therefore, the wording of each of the items was altered with the word "dating" deleted. Question one, for example, read: "I do not know my partner very well," instead of "I do not know my dating partner very well."

Parks and Adelman (1983) present uncertainty as a unidimensional construct measured by eight items. Factor analysis of these eight items using a principal axis extraction produced a single factor. Six of the eight items loaded on this factor at above the .50 level. This one factor accounted for 35% of the variance, and an attempt to extract a second factor failed. Therefore, Uncertainty is treated here as a unidimensional construct and the factor scores of this one factor are used as the measure of Uncertainty in subsequent analyses. In the present study a Cronbach's alpha estimate of reliability performed on the eight scales produced a reliability estimate of .79.

Activation/Arousal

The present study uses Thayer's measure of Activation level, administered according to the published instructions (Thayer, 1967). Subjects are asked to respond to a list of adjectives on a four-point scale. These four points are defined as: definitely feel, feel slightly, cannot decide, and definitely do not feel. The list of adjectives contains 28 that are indicative of activation, hidden among 21 nonactivation, mood-descriptive adjectives. These nonactivation items serve to disguise the purpose of the test.

Following Thayer (1967) a principal factors with iteration extraction and varimax rotation was used to factor analyze the activation scales. A General Activation factor was obtained with loadings of .50 or greater for the adjectives peppy, energetic, vigorous, lively, activated, full-of-pep, and active. This factor duplicates Thayer's general factor. A second factor, with loadings for the scales sleepy, tired, and drowsy, was reproduced in the present study, and is refered to here as the Tired/Sleepy factor. A third factor contained loadings from Thayer's High Activation adjectives: Jittery and clutched-up. The General Deactivation adjectives of calm, and at-rest loaded on a fourth. The factor scores generated for these factors were used in subsequent analyses as the indices of General Activation, Tired-Sleepy, High Activation, and Deactivation.

Subjects

The 130 participants were undergraduate volunteers from an introductory Fundamentals of Interpersonal Communication course. Participation in the study fulfilled a research component of the course for which they received credit. Participants were blindly assigned to 65 dyads although the number of male-male, male-female, and female-female dyads was controlled for.

Procedure

Participants were escorted into a sound studio and seated on either side of a small table so that they were facing each other. On this table in front of each of them was a microphone equiped with a lavaliere, a set of instructions turned blank side up, and a pencil. On the end of the table was a single form identified for use as a microphone test. Participants were instructed in how to put the microphones on so that they were 5 to 6 inches from their mouths and

left alone in the room. Participants were then asked to say the sentence, "Joe took father's shoe bench out." as a microphone test. Next participants read the description of a problem situation and discussed it for 15 minutes. When they had discussed the problem situation for fifteen minutes, the experimenter again asked participants to say the "Joe took father's shoe bench out." sentence. When both participants had said the sentence the second time, the experimenter returned to their room, and helped them remove the microphones.

Instrumentation

A series of five measures index the accommodation process as it occurs in speech. Speaking rate and utterance length are each measured. Vocal jitter is assessed through a set of three indices: jitter count, the relative amplitude of jitter peaks, and the jitter amplitude during the first steady state portion of a word. Each of these measures is made from a chart produced by a psychological stress evaluator (PSE). The psychological stress evaluator is designed to measure the microtremors, or vocal jitter, present in a human voice. As a person speaks the muscles controlling the vocal folds and the throat and nasal cavities responsible for producing speech vibrate. In a normal, healthy, relaxed voice these vibrations occur at a frequency of approximately 8 to 14 cycles per second (Rontal, Rontal, Jacob, & Rolnick, 1983; Kenety, 1980). Stress causes the vocal fold and other speech related muscles to tighten up, resulting in a reduction in this vocal jitter. The psychological stress evaluator is designed to filter an audio recording of a speech utterance, and produce a time-based chart of the vocal jitter within the utterance. The vertical axis of this chart displays the relative amplitude of the vocal jitter in millimeters. The horizontal time-based axis plots the utterance at a speed of 50 millimeters per second. This allows for a detailed analysis of the vocal jitter within the utterance to be made.

Validity and Reliability of the PSE. The psychological stress evaluator has been shown to provide an accurate measure of stress (Wiegele, 1978; Kenety, 1980), although its ability to demonstrate deception has been questioned (Barland, 1975; Sackett & Decker, 1979). In addition to the studies in lie-detection reported by the manufacturer (Dektor Counterintelligence and Security Inc., 1970), Brenner, Branscomb, and Schwartz (1979) report favorable instrument validation results from a number of non-lie-detection tasks. Kenety (1980) also reports results showing that the PSE can accurately indicate stress patterns. The conclusion from this evidence is that the PSE is a valid and reliable instrument for the present use of vocal quality analysis.

Data Collection

The vocal data to be analyzed with the PSE were collected before and after the conversation. High quality audio tape recordings were made at 19 centimeters per second. These recordings were analyzed with a psychological stress evaluator using a drive speed of 9.5 centimeters per second and a chart speed of 50 millimeters per second. This combination of record, drive, and chart speeds maximized the interpretability of the charts produced.

Analysis

Speaking rate is derived from a measure of word duration. Word duration is measured in millimeters along the horizontal time axis. Speaking rate is calculated by summing these word durations for the seven words in the "Joe took

father's shoe bench out." utterance and dividing by the number of words. This measurement is converted from millimeters to time duration in seconds by multiplying the number of millimeters by twenty, and dividing by one thousand, as determined by the chart speed. It is then divided by two to compensate for the difference in tape recording and play back speeds.

Utterance length is derived from the measure of word duration and between word gap duration. The between word gaps are measured in millimeters and converted to time durations using the same formula. Utterance length is calculated as a total of the seven word durations and the between word gap durations.

Jitter count is calculated by counting the number of jitter peaks in a word and dividing that number by the word duration. This produces a jitter count per millimeter value for each word which is summed across the words to obtain a value for the utterance.

The relative amplitude peak of jitter is measured as the distance in millimeters from the baseline to the top of the jitter peak having the largest amplitude. This measure is taken for each word in the utterance and summed across all of the words to obtain a single value for the utterance.

The jitter amplitude steady state is measured in millimeters as the distance between the maximum and minimum amplitude displacements in the jitter cycles. This measure is made for each word at the beginning of the first steady state portion of more than three jitter cycles. The obtained values are summed across all of the words to obtain a value for the utterance.

The combined measure of vocal jitter is calculated as the sum of the standardized scores obtained for jitter count, relative amplitude peak, and jitter amplitude steady state. Each of these measures are converted to z scores by subtracting the appropriate sample mean and dividing the result by the appropriate standard deviation (Hays, 1973). The three z scores are summed to provide an overall measure of vocal jitter.

To analyze a communicator's speech accommodation, his/her pre and post conversational scores are compared to the partner's pre-conversation score. This comparison takes the following form: Accommodation Score = (the absolute value of (the pre-test score minus a partner's pre-test score)) minus (the absolute value of (the post-test score minus a partner's pre-test score)). This formula derives an accommodation score from the difference in the distances of a participant's speech characteristics before and after a 15 to 20 minute conversation with a partner. The first part of the formula, (the absolute value of (the pre-test score minus a partner's pre-test score)), describes how much a participant's speech characteristics differ from a partner's characteristics before they begin conversing. The second part of the formula, (the absolute value of (the post-test score minus a partner's pre-test score)), describes how much a participant's score differs from that same partner's original characteristics after they have had their conversation. By subtracting the second part of the formula from the first, an accommodation score is obtained which indicates how much a participant has changed with regard to that partner. The larger the accommodation score the more a participant's speech characteristics have shifted toward a partner's characteristics. A negative score would indicate a shift away from a partner's pre-test characteristics. Speech Accommodation scores are obtained for Speaking Rate, Utterance Length, and Vocal Jitter Quality. To determine if a significant Speech Accommodation shift occurs, a test of the mean accommodation scores for each of these characteristics is performed. The null hypothesis to be tested is that no accommodative shifts occur for Speaking Rate, Utterance Length, or Vocal Jitter (i.e. the mean accommodation score is not significantly different from zero.)

To test this hypothesis the accommodation score means and standard errors of the mean are obtained and z scores are produced.

Results

1) What is the strength of the Speech Accommodation process? A regression analysis technique is used to answer this question. The first regression analysis is performed to remove the influence of a speaker's enduring speech characteristics. Post-test speech characteristics are predicted from a speaker's pre-test characteristics. Next a residual score is calculated be subtracting the speaker's predicted post-test score from the actual post-test score. A potential accommodation score is calculated as the difference between the speaker's characteristics and the partner's characteristics by subtracting the partner's post-test score from the speaker's post-test score. A second regression analysis is performed predicting the residual score from the potential accommodation score. The results are shown in Table 1.

Each of the speech characteristics are significantly influenced by a communicator's own preceding speech characteristics. Speaking Rate ($F(1,113) = 23.08$, $p < .001$), Utterance Length ($F(1,113) = 47.30$, $p < .001$), and Vocal Jitter ($F(1,113) = 86.76$, $p < .001$) post-test scores are all significantly determined by a speaker's pre-test scores.

Once this self influence is removed, the difference between a speaker's characteristic and a partner's associated speaking characteristic becomes significantly influential on the speaker's characteristics predicting a substantial portion of the residual variance. A partner's Speaking Rate ($F(1,113) = 68.11$, $p < .001$, R square = .37), Utterance Length ($F(1,113) = 54.40$, $p < .001$, R square = .31), and Vocal Jitter ($F(1,113) = 29.94$, $p < .001$, R square = .20) are all significant influences.

2) Is Speech Accommodation a convergent, divergent, or steady-state synchronous process? This question is answered by obtaining the accommodation score for each of the speech characteristics. Each of these scores is converted to a z score that can be tested for its statistical difference from zero. A significantly positive mean accommodation score indicates a convergent accommodation. A significantly negative mean accommodation score indicates a divergence. A score that is not significantly different from zero shows neither convergence nor divergence.

The results of these analyses are shown in Table 2. The Speaking Rate result (mean = 1.69, standard error = .78, $z = 2.17$) produces a mean that is significantly different from zero. The positive value of the mean shows that the direction of the shift is toward a converging accommodation. The mean Utterance Length accommodation score (mean = .22, standard error = .03, $z = 6.40$) and the Vocal Jitter accommodation score (mean = 8.11, standard error = .37, $z = 21.92$) also differ significantly from zero, and show convergence. The results of these analyses demonstrate that significant convergent accommodation occurs in the three speaking characteristics: Speaking Rate, Utterance Length, and Vocal Jitter.

3) What are some of the influences on the speech accommodation process? Specifically what are the influences of: a conversational partner's sex relative to speaker's sex; a communicator's level of cognitive uncertainty about the conversational partner; and the communicator's level of arousal?

A third set of analyses is performed to investigate these influences upon speech accommodation. To evaluate these influences a multivariate analysis of variance with covariates (MANCOVA) is undertaken. Dyad gender composition (male-male, male-female, female-female) forms the independent variable. The

Speaking Rate Accommodation score, Utterance Length Accommodation score, and Vocal Jitter Accommodation score are the dependent variables. Uncertainty, and the four measures of arousal: general activation, high activation, deactivation, and tired/sleepy are the covariates. Table 3 shows that high activation is a near significant covariate ($F(1,113) = 3.48$, $p = .06$) of Speaking Rate Accommodation. Table 4 indicates that the level of cognitive uncertainty is a significant covariate ($F(1,113) = 3.87$, $p = .05$) of Utterance Length Accommodation. Table 5 shows that none of the covariates exerted a significant influence on the Vocal Jitter Accommodation scores. Dyadic gender composition did not make a significant contribution to any of the accommodation indices.

Discussion

The present results provide evidence of an inter-speaker influence occurring at the acoustic level of speech communication. Significant accommodation occurs in each of the measured speech characteristics. The regression analyses show that a significant portion of the variance in a speaker's characteristics after a conversation are predictable from a conversational partner's speaking characteristics. While speech characteristics are, as Street (1984) noted, largely self-predictive in nature this added predictability from a partner's characteristics is of interest. It suggests that a conversational partner's characteristics do have an impact upon a speaker.

The second set of results show that the type of accommodation that takes place is one of convergence. Speaking characteristics are significantly more similar after the conversation than before. This finding is consistent across all three types of speech characteristics examined.

The analysis of the influences upon the accommodation process is less conclusive. The present results indicate that a convergence in conversational partners' activation levels on the high activation dimension is a near significant covariate of speaking rate accommodation. Uncertainty level and the other dimensions of activation are non-significant influences. This result is interesting but will need further investigation to be fully meaningful.

The level of interpersonal uncertainty is a significant covariate of utterance length accommodation. This result supports the findings of Welkowitz and Feldstein as reported in Street and Giles (1982). That research found that "interactants perceiving themselves as attitudinally similar tended to converge more on pause duration " (Street & Giles, 1982 p. 207).

While these two results are of interest, in the context of the other, non-significant results they are only suggestive--not conclusive. They do suggest, however, that the accommodation of different speech characteristics may be influenced by different underlying mechanisms. While speaking rate accommodation appears to be influenced by arousal levels, utterance length accommodation is more influenced by cognitive uncertainty. Vocal jitter accommodation is not affected significantly by either but may be affected by other, untested, influences.

The present study is of interest as it examines the accommodative shifts in three types of speaking characteristics: speaking rate, utterance length, and vocal jitter. Further, it provides evidence of substantial convergent accommodation occurring in those speech characteristics. Finally, it is suggestive of a varying impact of of underlying influences upon the accommodation process.

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Table 1

Regression Analysis

for Predicting Post-Test Speaking Rate,

Utterance Length, and Vocal Jitter

Step	Predictor	B Value	SS	F	R square
	SPEAKING RATE				
1	Self-Predictive	.40	1620.83	23.08*	.16
2	Accommodation Potential	.60	3050.71	68.11*	.37
	UTTERANCE LENGTH				
1	Self-Predictive	.53	7.17	47.30*	.28
2	Accommodation Potential	.55	5.67	54.40*	.31
	VOCAL JITTER				
1	Self-Predictive	.64	9745.31	86.76*	.42
2	Accommodation Potential	.45	2691.15	29.94*	.20

* significant at .001

n = 122

Table 2

Test of z scores to indicate direction of Speech Accommodation in Speaking Rate, Utterance Length, and Vocal Jitter

	Mean	N	Standard Error	z
Speaking Rate	1.69	121	.78	2.17*
Utterance Length	.22	122	.03	6.40**
Vocal Jitter	8.11	122	.37	21.92**

* significant at .01

** significant at .001

Table 3

Multivariate Analysis of Covariance Results

The Effect of Cognitive Uncertainty and

Arousal on Speaking Rate Accommodation

	df	SS	F	p	eta squared
COVARIATES					
Uncertainty	1	1.32	1.32	ns	
Arousal Levels					
General Activation	1	.57	.57	ns	
High Activation	1	3.50	3.48	.06+	.03
DeActivation	1	.12	.12	ns	
Tired/Sleepy	1	.31	.58	ns	
MAIN EFFECT					
Dyad Gender Composition	2	.36	.18	ns	
EXPLAINED	7	6.32			
RESIDUAL	113	113.38			
TOTAL	120	119.70			

Table 4

Multivariate Analysis of Covariance Results

The Effect of Cognitive Uncertainty and

Arousal on Utterance Length Accommodation

	df	SS	F	p	eta squared
COVARIATES					
Uncertainty	1	3.87	3.87	.05*	.03
Arousal Levels					
General Activation	1	2.25	2.24	ns	
High Activation	1	.01	.01	ns	
DeActivation	1	.50	.50	ns	
Tired/Sleepy	1	.15	.15	ns	
MAIN EFFECT					
Dyad Gender Composition	2	.16	.08	ns	
EXPLAINED	7	7.14			
RESIDUAL	113	113.15			
TOTAL	120	120.30			

Table 5

Multivariate Analysis of Covariance Results

The Effect of Cognitive Uncertainty and

Arousal on Vocal Jitter Accommodation

	df	SS	F	p	eta squared
COVARIATES					
Uncertainty	1	1.20	.34	.ns	
Arousal Levels					
General Activation	1	.15	.04	ns	
High Activation	1	.97	.27	ns	
DeActivation	1	.87	.24	ns	
Tired/Sleepy	1	.81	.23	ns	
MAIN EFFECT					
Dyad Gender Composition	2	1.84	.26	ns	
EXPLAINED	7	5.11			
RESIDUAL	113	406.00			
TOTAL	120	411.11			